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Deltares USA

North Head Circulation and Transport Pathways Modeling

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U.S. Geological Survey

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Take home message..

- A Delft3D hydrodynamic and sediment transport model has been developed and validated
- Objective is to quantify sediment transport pathways around proposed North Head disposal site
- Understand wave, tidal, and river discharge influence on currents and sediment transport
- Use computer sediment tracking to visualize, identify and quantify the pathways and linkages for a representative range of forcing conditions

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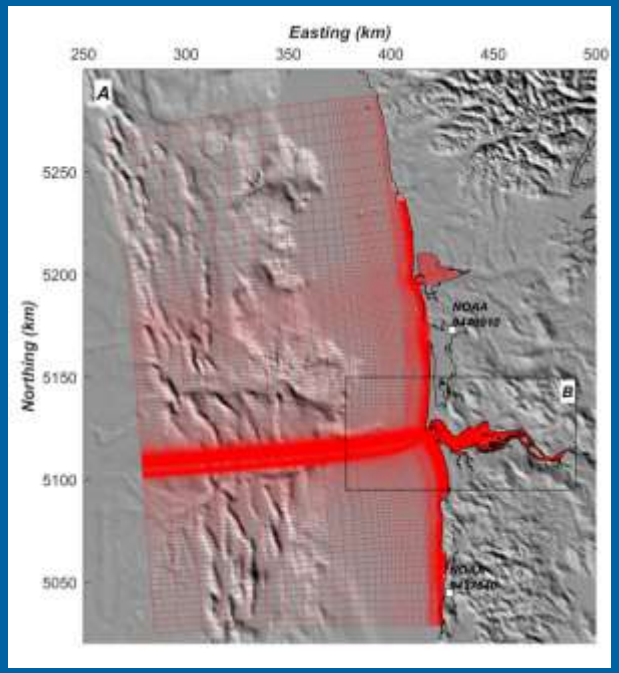
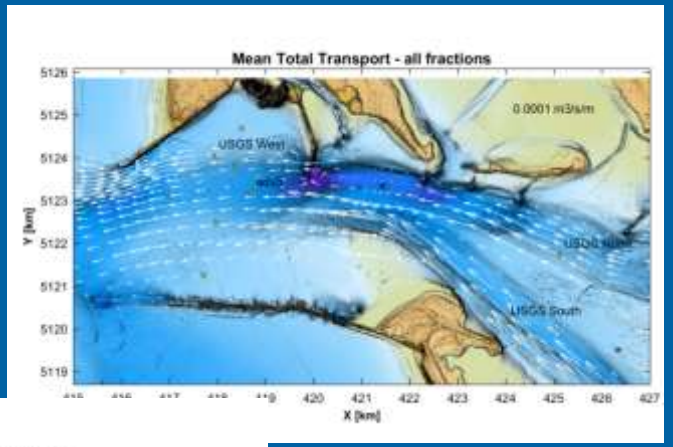
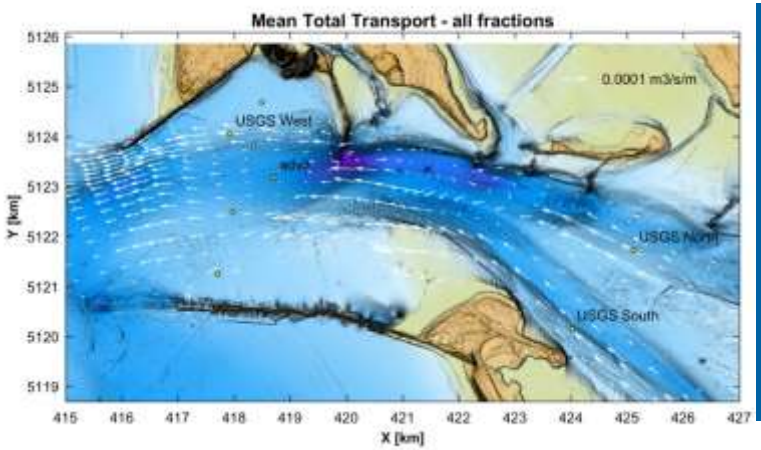
A hydrodynamic and sediment transport model has been developed since 2005



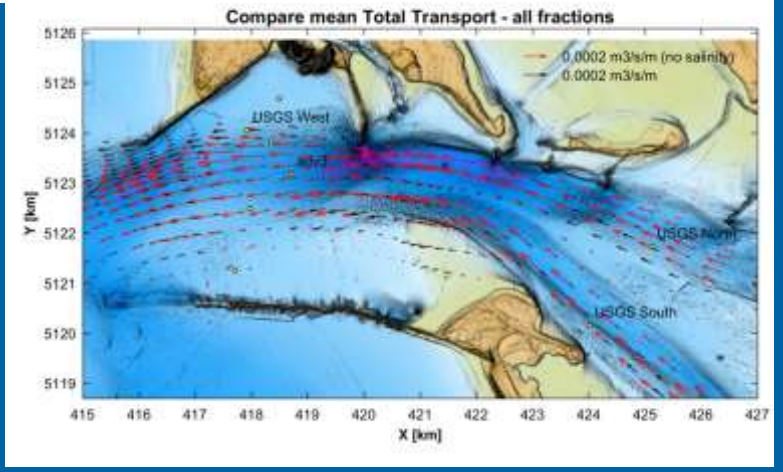
High river flow





Low river flow

Difference due to Salinity



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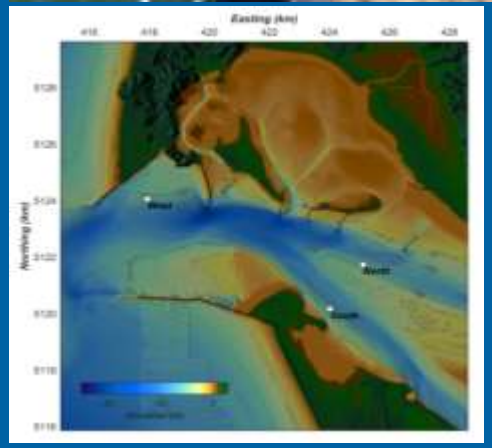
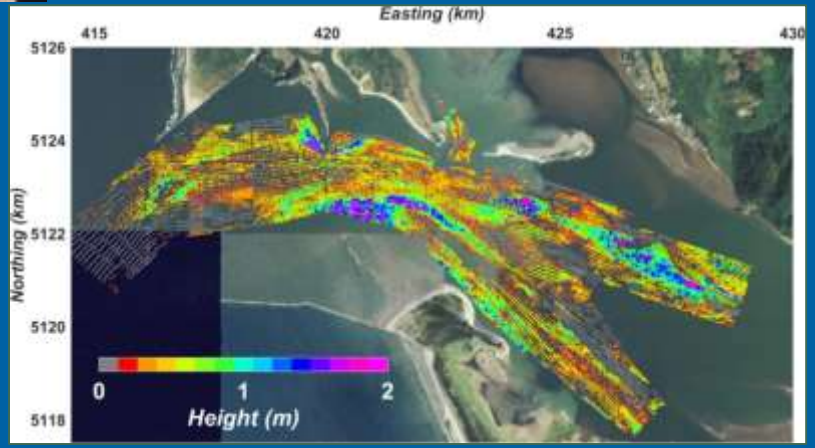
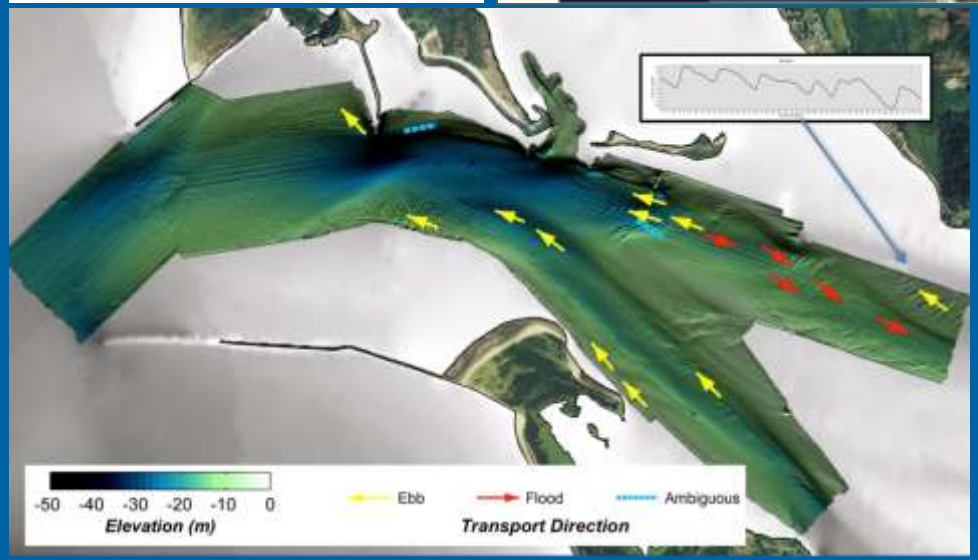
Extensive Field Measurements & Model Validation at the MCR

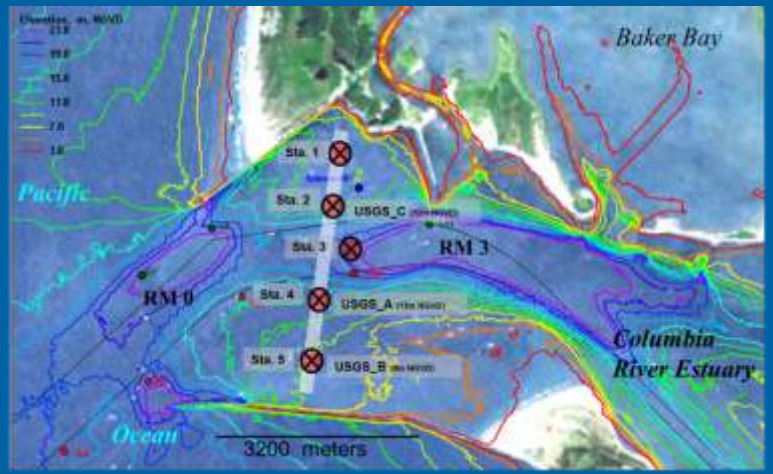
2015 Field measurements





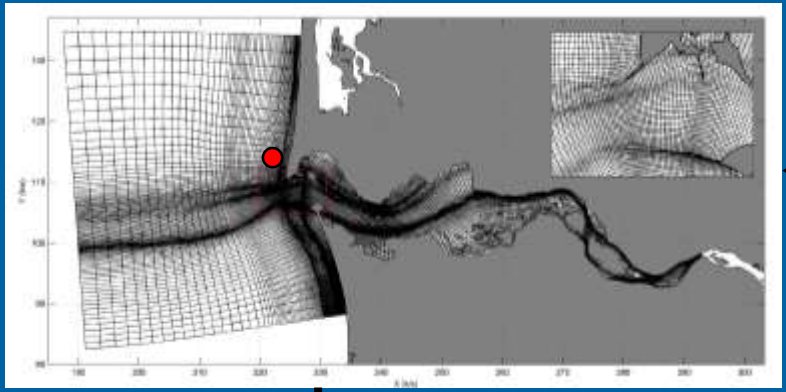
2005 Field measurements





Method

Optimize the model



Use representative conditions for river, wind and waves

Compute flow and sediment transports for these representative conditions.

Add sediment tracer at the dredge disposal site, to visualize, track sediment movement.

Allows us to identify,

(1) Sediment transport potential
Under what forcing conditions, will the dredge disposal material move (tides?, waves? ….).

(2) Sediment transport pattern, identify the connectively between sites, MCR and Long Beach.

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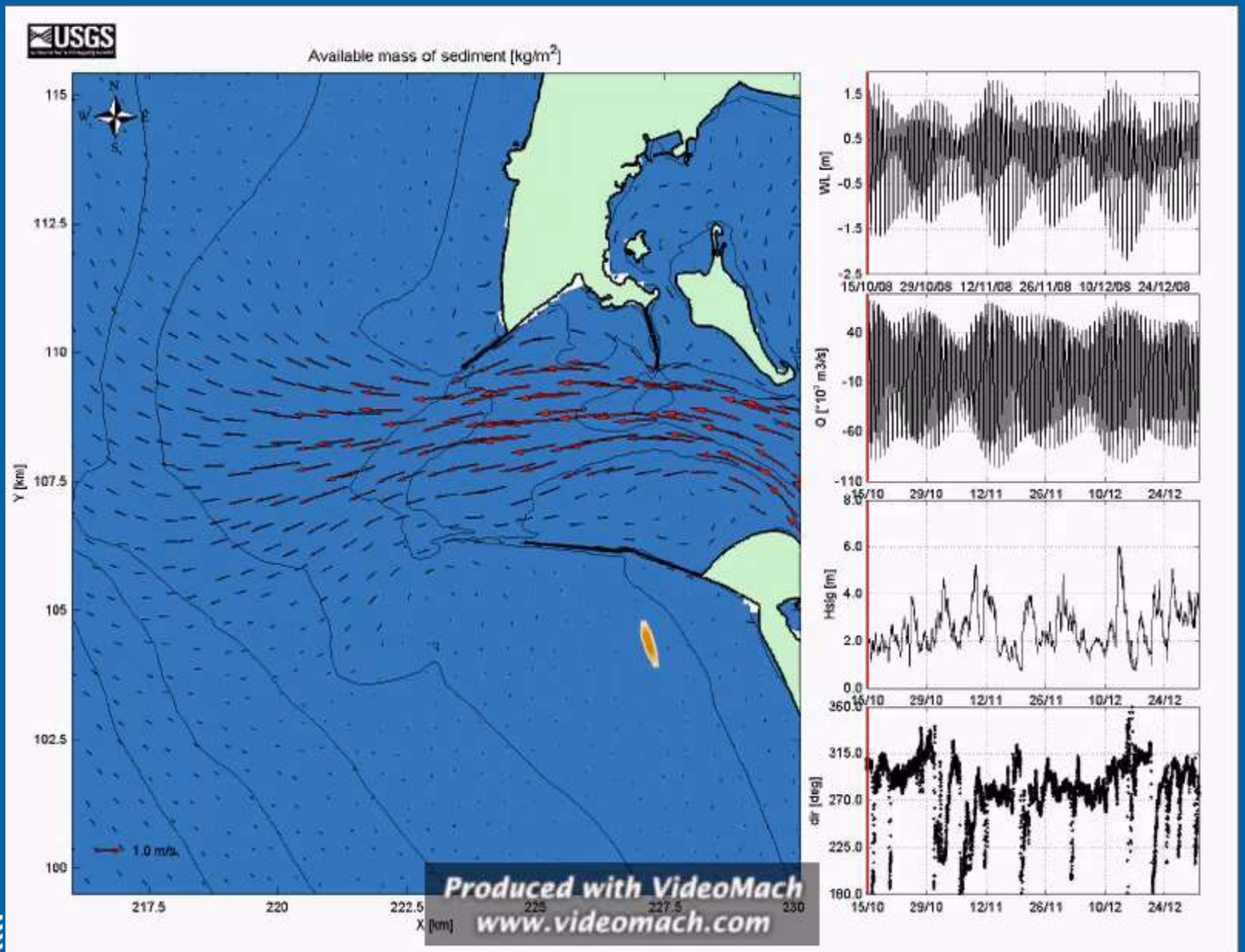
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Available mass of sediment [kg/m2]
N
W
E
S
115
112.5
110
107.5
105
102.5
100
Y [km]
217.5
220
222.5
225
227.5
230
X [km]
1.0 m/s
WL [m]
1.5
0.5
-0.5
-1.5
-2.5
15/10/08 29/10/08 12/11/08 26/11/08 10/12/08 24/12/08
Q [*10^3 m3/s]
40
-10
-60
-110
15/10
29/10
12/11
26/11
10/12
24/12
Hsig [m]
8.0
6.0
4.0
2.0
0.0
dir [deg]
360.0
315.0
270.0
225.0
180.0
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